



Curriculum and Instruction – Mathematics

Quarter 1

Statistics

Quarter 1		Quarter 2		Quarter 3		Quarter 4	
The Nature of Probability and Statistics, Frequency Distributions and Graphs, Data Description		Probability and Counting Rules, Discrete Probability Distributions, The Normal Distribution		Normal Distributions, Confidence Intervals and Sample Size, Hypothesis Testing		Testing the Difference Between Two Means, Two Proportions, and Two Variances, Other Chi-Square Tests, Correlation and Regression	
August 12, 2019 – October 11, 2019		October 21, 2019 – December 20, 2019		January 6, 2020 – March 13, 2020		March 23, 2020 – May 22, 2020	
S.ID.A.1	S.IC.A.3	S.CP.A.1	S.MD.B.10	S.MD.A.6		S.ID.B.10	
S.ID.A.2	S.IC.A.4	S.CP.A.2		S.MD.A.8		S.ID.B.11	
S.ID.A.3	S.IC.A.5	S.CP.A.3		S.MD.B.10		S.ID.B.12	
S.ID.A.4	S.IC.B.8	S.CP.B.4		S.IC.A.6		S.ID.B.13	
S.ID.A.5	S.IC.B.9	S.CP.B.5		S.IC.A.7		S.MD.A.8	
S.ID.A.6	S.IC.B.10	S.MD.A.1		S.IC.C.14		S.IC.B.12	
S.ID.A.7	S.IC.B.11	S.MD.A.2		S.IC.D.15			
S.ID.A.8	S.IC.C.13	S.MD.A.3		S.IC.D.16			
S.ID.A.9		S.MD.A.4		S.IC.D.17			
S.MD.B.9		S.MD.A.5		S.IC.E.18			
S.MD.B.10		S.MD.A.6		S.IC.E.19			
S.IC.A.1		S.MD.A.7a & b		S.IC.E.20			
S.IC.A.2		S.MD.A.8					



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Introduction

Destination 2025, Shelby County Schools' 10-year strategic plan, is designed not only to improve the quality of public education, but also to create a more knowledgeable, productive workforce and ultimately benefit our entire community.

What will success look like?

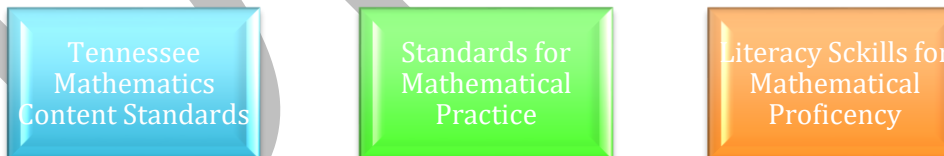


In order to achieve these ambitious goals, we must collectively work to provide our students with high quality, college and career ready aligned instruction. The Tennessee State Standards provide a common set of expectations for what students will know and be able to do at the end of a grade. The State of Tennessee provides two sets of standards, which include the Standards for Mathematical Content and The Standards for Mathematical Practice. The Content Standards set high expectations for all students to ensure that Tennessee graduates are prepared to meet the rigorous demands of mathematical understanding for college and career. The eight Standards for Mathematical Practice describe the varieties of expertise, habits of mind, and productive dispositions that educators seek to develop in all students. The Tennessee State Standards also represent three fundamental shifts in mathematics instruction: **focus, coherence and rigor**.

Instructional Shifts for Mathematics



Throughout this curriculum map, you will see resources as well as links to tasks that will support you in ensuring that students are able to reach the demands of the standards in your classroom. In addition to the resources embedded in the map, there are some high-leverage resources around the content standards and mathematical practice standards that teachers should consistently access. For a full description of each, click on the links below.





How to Use the Maps

Overview

An overview is provided for each quarter and includes the topics, focus standards, intended rigor of the standards and foundational skills needed for success of those standards.

Your curriculum map contains four columns that each highlight specific instructional components. Use the details below as a guide for information included in each column.

Tennessee State Standards

TN State Standards are located in the left column. Each content standard is identified as Major Content or Supporting Content (for Algebra I, Algebra II & Geometry only). A key can be found at the bottom of the map.

Content

This section contains learning objectives based upon the TN State Standards. Best practices tell us that clearly communicating measurable objectives lead to greater student understanding. Additionally, essential questions are provided to guide student exploration and inquiry.

Instructional Support & Resources

District and web-based resources have been provided in the Instructional Support & Resources columns. You will find a variety of instructional resources that align with the content standards. The additional resources provided should be used as needed for content support and scaffolding. The inclusion of vocabulary serves as a resource for teacher planning and for building a common language across K-12 mathematics. One of the goals for Tennessee State Standards is to create a common language, and the expectation is that teachers will embed this language throughout their daily lessons.



Topics Addressed in Quarter

- The Nature of Probability and Statistics
- Frequency Distributions and Graphs
- Data Description

Overview

Students have encountered some statistics and probability in previous courses, however in this course/quarter students can build off of previous standards by exploring data and making inferences and justifying conclusions. Students extend their work in probability and statistics by applying statistics ideas to real-world situations. They link classroom mathematics and statistics to everyday life, work, and decision-making, by modeling situations. They choose and use appropriate mathematics and statistics to analyze empirical situations, to understand them better, and to improve decisions. This quarter includes students distinguishing between population and sample, parameter and statistic, and descriptive and inferential statistics; recognizing purpose and difference of sample surveys, experiments, and observational studies; interpreting differences in shape, center, and spread including effects of outliers and using shape, center, and spread of comparable data to decide on appropriate statistical measures. Students also graph and interpret qualitative (categorical) and quantitative data sets using a variety of graphs.

TN STATE STANDARDS	CONTENT	INSTRUCTIONAL SUPPORT & RESOURCES	
Chapter 1-The Nature of Probability and Statistics (Allow 2 weeks for instruction, review, and assessment)			
<p>Domain: Making Inferences and Justifying Conclusions</p> <p>Cluster: Know the characteristics of well-designed studies.</p> <p>S.IC.A.1 Understand the differences among various kinds of studies and which types of inferences can be legitimately drawn from each.</p> <p>Domain: Making Inferences and Justifying Conclusions</p> <p>Cluster: Make inferences about population parameters based on a random sample from</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> • How can the study of Statistics be used in real life scenarios? • What are the benefits of interpreting data? • How do we study data? <p>Objective(s)</p> <p>The student will:</p> <ul style="list-style-type: none"> • Demonstrate knowledge of statistical terms. • Differentiate between the two branches of statistics. 	<p>Elementary Statistics Textbook (Bluman)</p> <p>1-1 Descriptive and Inferential Statistics</p> <p>Additional Resource(s)</p> <p>Elementary Statistics 7th edition Bluman</p> <p>(PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p> <p>Against All Odds Video, Unit 1 What is Statistics?</p> <p>(Against All Odds is a Video Series that introduces a statistical topic and illustrates it with a real-world example.)</p>	<p>Vocabulary (Chapter 1)</p> <p>cluster sample, confounding variable, continuous variables, control group, convenience sample data, data set, data value or datum, dependent variable, descriptive statistics, discrete variables</p> <p>experimental study, explanatory variable</p> <p>Hawthorne effect, hypothesis testing, independent variable, inferential statistics</p> <p>interval level of measurement, measurement scales, nominal level of measurement</p> <p>observational study ordinal level of measurement, outcome variable, population, probability, qualitative variables, quantitative</p>



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<p>that population.</p> <p>S.IC.C.13 Develop and evaluate inferences and predictions that are based on data.</p>		<p>Task(s)</p> <p>Illustrative Math – Statistics & Probability Tasks</p> <p>Statistics Teacher (https://www.statisticteacher.org/) (An online journal published by the American Statistical Association – National Council of Teachers of Mathematics Joint Committee on Curriculum in Statistics and Probability for Grades K-12.)</p>	<p>variables, quasi-experimental study, random sample, random variable, ratio level of measurement, sample, statistics, stratified sample, systematic sample, treatment group, variable</p> <p>Elementary Statistics Textbook (Bluman) <i>Statistics Today</i>, pp. 2, 29 <i>Critical Thinking Challenges</i>, p. 31 <i>Speaking of Statistics</i>, pp. 5, 11 <i>Applying the Concepts</i>, pp. 5, 9, 13, 16 <i>Extending the Concepts</i>, p.28 <i>Data Projects</i>, p.32 <i>TI-83/84 Step by Step</i>, pp. 21-22</p>
<p>Domain: Interpreting Categorical and Quantitative Data</p> <p>Cluster: Understand, represent, and use univariate data</p> <p>S.ID.A.1 Understand the term 'variable' and differentiate between the data types: measurement, categorical, univariate and bivariate.</p>	<p>Objective(s) The student will:</p> <ul style="list-style-type: none"> Identify the measurement level for each variable. 	<p>Elementary Statistics Textbook (Bluman) 1-2 Variables and Types of Data</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p> <p>Task(s) Illustrative Math – Statistics & Probability Tasks First Day Statistics Activity--Grouping Qualitative Data</p>	<p>Utilize <u>Tasks</u> to include the <i>Standards for Mathematical Practice</i> where students have to <i>reason, justify, explain, construct & model</i> their thinking.</p>
<p>Domain: Making Inferences and Justifying Conclusions</p> <p>Cluster: Design and conduct a statistical experiment to study a problem, then interpret and communicate the outcomes.</p> <p>S.IC.B.8 Select a method to collect data and plan and conduct surveys and experiments.</p>	<p>Objective(s) The student will:</p> <ul style="list-style-type: none"> Demonstrate knowledge of the four basic sampling methods. 	<p>Elementary Statistics Textbook (Bluman) 1-3 Data Collection and Sampling Techniques</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p>	



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<p>S.IC.B.9 Compare and use sampling methods, including simple random sampling, stratified random sampling, and cluster sampling.</p> <p>S.IC.B.10 Test hypotheses using appropriate statistics.</p> <p>S.IC.B.11 Analyze results and make conclusions from observational studies, experiments, and surveys.</p>		<p>Statistics Teacher (https://www.statisticteacher.org/) (An online journal published by the American Statistical Association – National Council of Teachers of Mathematics Joint Committee on Curriculum in Statistics and Probability for Grades K-12.)</p> <p>Task(s) Illustrative Math – Statistics & Probability Tasks</p>
<p>Domain: Making Inferences and Justifying Conclusions</p> <p>Cluster: Know the characteristics of well-designed studies.</p> <p>S.IC.A.2 Compare census, sample survey, experiment, and observational study.</p> <p>S-IC.A.3 Describe the role of randomization in surveys and experiments.</p> <p>S.IC.A.4 Describe the role of experimental control and its effect on confounding.</p> <p>S.IC.A.5 Identify bias in sampling and determine ways to reduce it to improve results.</p>	<p>Objective(s) The student will:</p> <ul style="list-style-type: none"> • Explain the difference between an observational study and an experimental study. • Describe the role of randomization in surveys and experiments. • Recognize faulty questions on a survey and other factors that can bias responses. • Know the characteristics of well-designed studies. • Explain how statistics can be used and misused. 	<p>Elementary Statistics Textbook (Bluman) 1-4 Observational and Experimental Studies 1-5 Uses and Misuses of Statistics</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p> <p>Statistics Teacher (https://www.statisticteacher.org/) (An online journal published by the American Statistical Association – National Council of Teachers of Mathematics Joint Committee on Curriculum in Statistics and Probability for Grades K-12.)</p> <p>Task(s) Illustrative Math – Statistics & Probability Tasks Chocolicious</p>



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Chapter 2- Frequency Distributions and Graphs (Allow 3 weeks for instruction, review, and assessment)			
<p>Domain: Interpreting Categorical and Quantitative Data</p> <p>Cluster: Understand, represent, and use univariate data</p> <p>S-ID.A.2 Understand histograms, parallel box plots, and scatterplots, and use them to compare and display data.</p> <p>S-ID.A.8 Construct and interpret two-way frequency tables of data when two categories are associated with each object being classified. Use the two-way table as a sample space to decide if events are independent and to approximate conditional probabilities.</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> How do you construct a frequency distribution? How can frequency tables help us to find trends in real life scenarios? How do you use and interpret stem and leaf plots? How do you represent data in frequency distributions using histograms, frequency polygons, and ogives? <p>Objective(s): The student will:</p> <ul style="list-style-type: none"> Organize univariate data using a frequency distribution. 	<p>Elementary Statistics Textbook (Bluman) 2-1 Organizing Data</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p> <p>Task(s) Illustrative Math – Statistics & Probability Tasks Texting by the Numbers- A Solidify Understanding Task, pp. 3-7</p>	<p>Vocabulary (Chapter 2): bar graph, categorical frequency distribution, class, class boundaries, class midpoint, class width, cumulative frequency, cumulative frequency distribution, frequency, frequency distribution, frequency polygon, grouped frequency distribution, histogram, lower class limit, ogive, open-ended distribution, Pareto chart, pie graph, raw data, relative frequency graph, stem and leaf plot, time series graph, ungrouped frequency distribution, upper class limit</p> <p>Elementary Statistics Textbook (Bluman) <i>Statistics Today</i>, pp. 36, 97 <i>Critical Thinking Challenges</i>, pp.99-100 <i>Speaking of Statistics</i>, pp.74, 81 <i>Applying the Concepts</i>, pp. 45-46, 60, 83-84 <i>Extending the Concepts</i>, pp. 48, 63, 86-87 <i>Data Projects</i>, pp.100-101 <i>TI-83/84 Step by Step</i>, pp. 64-65, 91</p>
	<p>Objective(s): The student will:</p> <ul style="list-style-type: none"> Represent quantitative data graphically using histograms, dot plots, and orgives. 	<p>Elementary Statistics Textbook (Bluman) 2-2 Histograms, Frequency Polygons, and Orgives</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Prudential Commercial Against All Odds Video, Unit 3 Histograms</p> <p>Task(s) Illustrative Math – Statistics & Probability Tasks</p>	



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	<p>Objective(s): The student will:</p> <ul style="list-style-type: none"> • Represent data using bar graphs, Pareto charts, time series graphs, and pie graphs. • Draw and interpret a stem and leaf plot. 	<p>Elementary Statistics Textbook (Bluman) 2-3 Other Types of Graphs</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p> <p>Task(s) Illustrative Math – Statistics & Probability Tasks</p>	
<p>Chapter 3 – Data Description (Allow 4 weeks for instruction, review, and assessment)</p>			
<p>Domain: Interpreting Categorical and Quantitative Data</p> <p>Cluster: Understand, represent, and use univariate data</p> <p>S.ID.A.3 Summarize distributions of univariate data.</p> <p>S.ID.A.4 Compute basic statistics and understand the distinction between a statistic and a parameter.</p> <p>S.ID.A.5 For univariate measurement data, be able to display the distribution, describe its shape; select and calculate summary statistics.</p> <p>S.ID.A.6 Recognize how linear transformations of univariate data affect shape, center, and spread.</p> <p>S.ID.A.7 Analyze the effect of changing units on summary measures.</p>	<p>Essential Question(s):</p> <ul style="list-style-type: none"> • How do we organize, display, and describe data? • How does mean, median, and mode describe data? • How can percentiles be used when comparing an individual to the norm? • How does exploratory data analysis help us to better understand our data? <p>Objective(s): The student will:</p> <ul style="list-style-type: none"> • Use a variety of numerical techniques to describe the central tendency of a distribution including mean, median, mode, and midrange. 	<p>Elementary Statistics Textbook (Bluman) 3-1 Measures of Center</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Khan Academy Videos – Measures of Central Tendency Against All Odds Video, Unit 4 Measures of Center</p> <p>Statistics Teacher (https://www.statisticteacher.org/)</p>	<p>Vocabulary: (Chapter 3) bimodal, boxplot, Chebyshev’s theorem, coefficient of variation, data array, decile, empirical rule, exploratory data, analysis (EDA), five-number summary, interquartile range (IQR), mean, median, midrange, modal class, mode, multimodal, negatively skewed or left skewed distribution, outlier, parameter, percentile, positively skewed or right skewed distribution, quartile range, range rule of thumb, resistant statistic, standard deviation, statistic, symmetric distribution, unimodal, variance, weighted mean, z score or standard score</p> <p>Elementary Statistics Textbook (Bluman) <i>Statistics Today</i>, pp. 104, 175 <i>Critical Thinking Challenges</i>, pp.178-180</p>



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<p>S.ID.A.9 Describe individual performances in terms of percentiles, z-scores, and t- scores.</p> <p>Domain: Using Probability to Make Decisions Cluster: Understand the normal probability distribution.</p> <p>S.MD.B.9 Calculate the mean (expected value) and standard deviation of both a random variable and a linear transformation of a random variable.</p> <p>S.MD.B.10 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.</p>		<p>Task(s) Pick a Pocket Are Female Hurricanes Deadlier than Male Hurricanes? Illustrative Math – Statistics & Probability Tasks</p>	<p><i>Speaking of Statistics</i>, p.109 <i>Applying the Concepts</i>, pp. 118, 137, 153, 166 <i>Extending the Concepts</i>, pp. 121-122, 140-141, 168 <i>Data Projects</i>, pp.179-180 <i>TI-83/84 Step by Step</i>, pp. 158-159, 169-170</p>
	<p>Objective(s): Students will</p> <ul style="list-style-type: none"> Use a variety of numerical techniques to describe the variation in a distribution. These should include variance, standard deviation, and range. 	<p>Elementary Statistics Textbook (Bluman) 3-2 Measures of Variation</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Khan Academy Videos – Variance and Standard Deviation Against All Odds Video, Unit 6 Standard Deviation</p> <p>Statistics Teacher (https://www.statisticteacher.org/)</p> <p>Task(s) Understanding Standard Deviation Illustrative Math – Statistics & Probability Tasks</p>	<p>Utilize <u>Tasks</u> to include the <i>Standards for Mathematical Practice</i> where students have to <i>reason, justify, explain, construct & model</i> their thinking.</p>
	<p>Objective(s): Students will</p> <ul style="list-style-type: none"> Identify the position of a data set using various measures of position. These should include z-scores, percentiles, and interquartile range. 	<p>Elementary Statistics Textbook (Bluman) 3-3 Measures of Position</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman</p>	



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	<ul style="list-style-type: none"> Interpret graphical displays in terms of shape, center, and spread of the distribution, as well as gaps and outliers. 	(PowerPoints, Chapter PDF files, Solutions Manual, etc.) Task(s) Data Distributions – A Solidify/Practice Understanding Task Illustrative Math – Statistics & Probability Tasks	
<p>Domain: Interpreting Categorical and Quantitative Data</p> <p>Cluster: Understand, represent, and use univariate data</p> <p>S.ID.A.2 Understand histograms, parallel box plots, and scatterplots, and use them to compare and display data.</p>	<p>Objective(s): Students will</p> <ul style="list-style-type: none"> Use the techniques of exploratory data analysis, including boxplots and five-number summaries, to discover various aspects of data. 	<p>Elementary Statistics Textbook (Bluman) 3-4 Exploratory Data Analysis</p> <p>Additional Resource(s) Elementary Statistics 7th edition Bluman (PowerPoints, Chapter PDF files, Solutions Manual, etc.) Against All Odds Video, Unit 5, Boxplots</p> <p>Task(s) Now You See It, Now You Don't: Using See It to Compare Stacked Dotplots to Boxplots Illustrative Math – Statistics & Probability Tasks</p>	



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RESOURCE TOOLKIT

<p>Textbook Resources Elementary Statistics 7th edition Bluman (Includes PowerPoints, Chapter PDF files, Solutions Manual, etc.)</p>	<p>Standards Common Core Standards - Mathematics Common Core Standards - Mathematics Appendix A The Mathematics Common Core Toolbox Common Core Lessons Tennessee Academic Standards for Mathematics</p>	<p>Videos Against All Odds Videos (with Study Guides) (A Video Series that introduces a statistical topic and illustrates it with a real-world example.) Khan Academy</p>
<p>Calculator Texas Instruments Education http://www.casioeducation.com/educators Desmos</p>	<p>Interactive Manipulatives Stat Trek AmStat.org Applet Collection</p>	<p>Additional Sites Statistics Teacher (https://www.statisticsteacher.org/) (An online journal published by the American Statistical Association – National Council of Teachers of Mathematics Joint Committee on Curriculum in Statistics and Probability for Grades K-12.) The Data and Story Library Fed Stats Bureau of Labor Statistics Educational Statistics NCTM Math Illuminations United States Census Bureau Statistics Education Web Illustrative Math – Statistics & Probability Tasks Mathematics Vision Project: Modeling Data Georgia Standards of Excellence: Unit 9 Probability Georgia Standards of Excellence: Unit 8: Inferences & Conclusions from Data Edutoolbox (formerly TNCore)</p>
<p>ACT & SAT TN ACT Information & Resources ACT College & Career Readiness Mathematics Standards SAT Connections SAT Practice from Khan Academy</p>		